E7.2-10.317
CR-129575

UTILIZATION OF ERTS-1 DATA IN NORTH CAROLINA

C. W. Welby, J. O. Lammi, R. J. Carson
North Carolina State University
Raleigh, North Carolina 27607

December 1972
Interim Report for Period May - November 1972

GODDARD SPACE FLIGHT CENTER
Greenbelt, Maryland 20771

(E72-10317) UTILIZATION OF ERTS-1 DATA IN NORTH CAROLINA Interim Report, May - Nov. 1972 C.W. Welby, et al (North Carolina State Univ.) Dec. 1972 8 p
CSCL 08F G3/13

N73-13366

Unclas
00317

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
1		

4. Title and Subtitle	5. Report Date
UTILIZATION OF ERTS-1 DATA IN NORTH CAROLINA	December, 1972
	6. Performing Organization Code
7. Author(s) C. W. Welby, J. O. Lammi, R. J. Carson	8. Performing Organization Report No.
9. Performing Organization Name and Address North Carolina State University Raleigh, North Carolina 27607	10. Work Unit No.
	11. Contract or Grant No. NAS5-21732
12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered Interim Report for May-Nov., 1972
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

Initial study and interpretation of ERTS-1 imagery indicates its usefulness for regional land use planning purposes in North Carolina. Quarries, many secondary roads, and the existence of urbanization as well as changes in urban areas may be mapped. Differences in spectral response for various parts of the major cities suggests that the type of activity in urbanized areas may be monitored. Geologic mapping at a scale of 1:250,000 may be possible. The major unfavorable comment to date from various organizations and agencies who are potential users has been to the relatively small scale. The imagery is a powerful illustrative tool for the several state agencies cooperating in the investigation.

17. Key Words (Selected by Author(s))	18. Distribution Statement
land-use planning geologic mapping scale	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
		5	

*For sale by the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

1.0 Preface

The objective of the investigation is to demonstrate the usefulness of the ERTS-1 imagery in geological evaluation, regional planning, forest management, and water management in North Carolina. Visual analysis of the imagery as well as color additive viewing is to be utilized in interpreting the imagery.

For the period covered by this report generalized study of the imagery available has been undertaken and agencies and persons possibly interested in its use have been contacted.

The imagery appears useful for regional planning purposes and for some geological interpretations. A combination of MSS bands 5 and 6 seem most useful for interpreting various features. No specific studies related to forest management and water management have been undertaken up to this time.

2.0 Introduction.

This report describes the work accomplished under ERTS-A Data Investigation Contract NAS5-21732 during the period May-November, 1972. Because of the limited amount of imagery received during the August-November interval, the main thrust of the investigation has been to acquaint the investigators with the imagery and to acquaint personnel of the various state agencies with the imagery.

2.1 Discussion.

During the first six months of the investigation considerable time has been spent acquainting cooperating agencies and personnel with the details of the program. Inadequate image coverage of the test site area (the State of North Carolina) has prevented more than crude evaluation of the imagery. Using the imagery available during the August-November period, we have discussed ideas for its practical application with personnel of various agencies.

A borrowed color additive viewer was used to study imagery from the Roanoke River area (Image No. 1062-15195), from the Winston-Salem test site (Image No. 1064-15312), and the Raleigh to Greensboro area (Image No. 1045-15254), and of the Florence, S. C. - Fayetteville, N. C. area (Image No. 1063-15260). Copies were made of the image on the screen with a 35 mm hand-held camera. Vegetative differences and water-quality differences were accentuated in the Roanoke River imagery (No. 1062-15195) and in the Winston-Salem area image (No. 1064-15312).

The changes in the shape of the cities of Raleigh, Greensboro, and Winston-Salem since the latest regional maps available were published can be evaluated from the imagery, and the measurement of the extent of urbani-

zation and changes in urban areas in the cities of North Carolina may well be one of the early results of the investigation.

Quarries, new road cuts, the New Hope dam site and extension of urbanization along major highways may all be recognized in the MSS Band 5 imagery (1045-15254). Many secondary roads can be recognized and mapped in the Piedmont area. Of particular interest is the fact that the central cores of the major cities appear as moderately dark gray areas on MSS Band 7 (e.g., Image No. 1045-15254) and the more newly developed areas reflect as nearly white areas (e.g. the strip along U. S. 70 west of Raleigh in Image 1045-15254) in the MSS Band 5. Based upon the cursory examination of Image No. 1045-15254, it appears possible to distinguish between the Commercial-Industrial parts of the city and the surrounding residential-office and institutional areas.

Structural trends in the Carolina slate belt are recognizable (e.g. Image No. 1045-15254, near High Rock and Badin Lakes), and the granite masses 10 to 15 miles northwest of Greensboro are also recognizable on the basis of their linear pattern and contrasting, light-gray reflectances. Other structural trends are recognizable but have not been checked against existing maps or in the field.

The boundary between the Piedmont and Coastal Plain provinces is easily recognized (Images No. 1045-15254; 1063-15260). The drainage pattern on the Coastal Plain is particularly well documented, and floodplain mapping along major streams seems feasible.

The major disappointment to date has been the lack of imagery from the Asheville area. A combination of poor weather conditions and delays in processing data seem to have combined to keep us from receiving any data from this part of the state.

2.1.1 Significant Results.

Each major city appears to have a different spectral pattern, although each has a recognizable bright core surrounded by a grayer rim in MSS Band 5 (Image No. 1045-15254).

Geologic mapping of the Piedmont at a scale of 1:250,000 or 1:125,000 may be possible from the combination of bands. Some major structural trends are easily recognizable (Image No. 1045-15254).

Land-use patterns, including the spatial relations to secondary roads, can be determined and mapped if reasonable care is exercised. The imagery will be of considerable use to those making regional land-use plans and for monitoring changes. Use of the imagery for detailed floodplain mapping seems possibly feasible in the Coastal Plain.

The major unfavorable response has been that to the scale of the imagery. For many practical uses the scale is too small, and better information than that supplied by ERTS-1 imagery is already available. On the other hand, the repetitive coverage permits the updating of small scale maps in those areas where rapid land use changes are occurring.

No cost/benefit studies have been made as yet. However, for some sorts of mapping even visual study of the imagery will improve the data collection rate and the transference of the information to appropriate agencies.

2.2 Future Program.

Plans for the next reporting interval include reproducing selected images as positive prints and making them available to cooperating State and University agencies for field checking of various features. The Piedmont Triad Council of Governments (Winston-Salem test site) will attempt to use parts of Image No. 1045-15254 in inventorying land use and in classifying

woodlands.

For the Raleigh area, ground truth investigations will be made for selected areas in order to build an inventory of spectral responses and type of land use. Soil moisture studies will be begun utilizing information from the Central Crops Station at Clayton. For the Wilmington area field checking of land-use patterns and types of crops grown in certain areas will be undertaken. It is expected that soil moisture information for days of overflight will be gathered from the Wilmington area and specifically at the Horticultural Crops Research Station at Castle Hayne. Attempts will be made to correlate on-going current and sediment studies in the coastal area with the passage of ERTS-1.

An on-going study of the relationship of drainage networks in the Coastal Plain to the type of soils, sediments, and hydrology will be completed.

Ground truth observations will be made by an extension forester associated with the School of Forest Resources in the northeastern part of the state, and in particular in the Roanoke River Valley.

If imagery is obtained of the Asheville test site, spectral responses recorded on the imagery will be studied in conjunction with soil moisture and solar radiation ground truth measurements that have been carried out since the launch of ERTS-1.

Studies of sediment input and dispersal in major water bodies will be initiated. Cooperation of the Office of Water and Air Resources in this study is anticipated.

In the next six months delivery will be made on a multispectral camera and a color additive viewer, funded from University and State sources. These

will be applied to specific problems pertaining to the purposes of the ERTS-1 investigation.

3.0 Conclusions.

From the imagery at hand it appears that there will be several regional uses made of the imagery. Specifically, the imagery will help in the land-use inventorying and land-use planning that is currently underway in North Carolina. The images can serve as base maps for much of the state if blown up to a scale of 1:250,000, or 1:125,000.

Monitoring of major excavations and land clearings seems possible. Known quarries are easily recognizable as are road cuts. Clearing of land for various sorts of developments probably can be monitored, as can clear cutting.

We have not had enough experience with the imagery to determine its effectiveness in monitoring forest fire danger or forest disease.

One important conclusion is the fact that as a base map showing actual geographical relationships, the imagery is a powerful illustrative tool. It gives a new dimension to those used to thinking only in terms of road maps, or perhaps standard USGS topographic maps. If used properly the imagery may be very helpful in influencing local governmental agencies to improve the land-use practices in the areas under their jurisdiction.

4.0 Recommendations.

It is generally recommended that the procedures outlined in the proposal be followed and that continuing efforts be made to involve a broad spectrum of people in the use and interpretation of the imagery.